

WHAT IS CLAIMED IS:

1. A polymerase chain reaction (PCR) apparatus comprising:

a solution holder to separately hold plural samples of reaction mixture;

5 a heat exchanging structure to cyclically control, for specified durations, a temperature of plural samples of reaction mixture among plural temperatures; and

an aliquot dispensing mechanism to dispense, from each sample of a set of the plural samples held by the solution holder, plural aliquots of a given sample to respective separate aliquot holders.

10 2. The apparatus according to claim 1, wherein the set of the plural samples comprises all of the plural samples.

3. The apparatus according to claim 1, wherein the solution holder comprises at least one block made of a heat-conducting substance.

4. The apparatus according to claim 1, wherein the at least one block comprises at least one metal block.

15 5. The apparatus according to claim 3, wherein the at least one metal block comprises an aluminum block.

6. The apparatus according to claim 1, wherein the solution holder comprises any vessel of any material.

20 7. The apparatus according to claim 1, wherein the solution holder comprises wells etched in silica.

8. The apparatus according to claim 1, wherein the solution holder comprises plural capillary tubes having closed ends.

9. The apparatus according to claim 8, wherein the solution holder comprises plural capillary tubes having ends closed by sealing the ends.

10. The apparatus according to claim 8, wherein the solution holder comprises capillary tubes having oil at either end of the respective capillary tubes.

11. The apparatus according to claim 8, wherein the solution holder comprises plural capillary tubes having ends closed with valves.

5           12. The apparatus according to claim 1, wherein the plural samples comprise a multiple of 96 samples.

13. The apparatus according to claim 1, wherein the heat exchanging structure comprises at least one metal block.

10           14. The apparatus according to claim 1, wherein the heat exchanging structure comprises at least one hot air oven.

15. The apparatus according to claim 1, wherein the heat exchanging structure comprises at least one water bath.

16. The apparatus according to claim 1, wherein the temperatures comprise three incubation temperatures.

15           17. The apparatus according to claim 16, wherein the temperatures are in a range of 45-99 degrees Celsius.

18. The apparatus according to claim 1, wherein the temperatures include temperatures for denaturing of 80-99 degrees Celsius, for annealing of 45-65 degrees Celsius, and for extension of 60-75 degrees Celsius.

20           19. The apparatus according to claim 1, wherein the temperatures comprise two incubation temperatures.

20. The apparatus according to claim 19, wherein the temperatures comprise 94 degrees Celsius and 50-65 degrees Celsius.

25           21. The apparatus according to claim 1, further comprising a loading apparatus to load samples into the solution holder.

22. The apparatus according to claim 1, wherein the aliquot holders comprise wells of microtitre trays.

23. The apparatus according to claim 22, wherein the aliquot holders comprise wells of 96 well microtitre trays.

5        24. The apparatus according to claim 22, wherein the aliquot holders comprise wells of 384 well microtitre trays.

25. The apparatus according to claim 1, wherein the aliquot holders comprise one of sample holders and sample inputs of another instrument.

10       26. The apparatus according to claim 1, wherein the aliquot holders comprise sample holders of an instrument module.

27. A polymerase chain reaction (PCR) apparatus comprising:

        a solution holder to separately hold plural samples of reaction mixture;

        a heat exchanging structure to cyclically control, for specified durations, a temperature of plural samples of reaction mixture among plural temperatures; and

15        an automatic dispensing mechanism to automatically dispense, from each sample of a set of the plural samples held by the solution holder, plural aliquots of a given sample to respective separate aliquot holders.

28. The apparatus according to claim 27, wherein the automatic dispensing mechanism comprises a process control to automatically dispense the plural aliquots of a given sample at  
20        respective different cycles of an amplification regimen.

29. A nucleic acid amplification apparatus comprising:

        a solution holder to separately hold plural samples of reaction mixture;

        a reaction system to cause amplification of nucleic acids in the reaction mixture of respective ones of the plural samples; and

an aliquot dispensing mechanism to dispense, from each sample of a set of the plural samples held by the solution holder, plural aliquots of a given sample to respective separate aliquot holders.

30. The apparatus according to claim 29, wherein said dispensing mechanism comprises  
5 an automatic dispensing mechanism to automatically dispense, from each sample of a set of the plural samples held by the solution holder, plural aliquots of a given sample to respective separate aliquot holders.

31. The apparatus according to claim 30, wherein the automatic dispensing mechanism comprises a process control to automatically dispense the plural aliquots of a given sample at  
10 respective different times during an amplification regimen.

32. An amplification profiling apparatus comprising:

a solution holder to separately hold plural samples of reaction mixture;

a reaction system to cause amplification of nucleic acids in the reaction mixture of respective ones of the plural samples; and

15 an aliquot dispensing mechanism to dispense, from each sample of a set of the plural samples held by the solution holder, plural aliquots of a given sample to respective separate aliquot holders; and

a separation device to analyze aliquots in the aliquot holders and separate, from respective ones of the aliquots, individual nucleic acid molecules based on physical properties of  
20 the nucleic acid molecules.

33. The apparatus according to claim 32, wherein said dispensing mechanism comprises an automatic dispensing mechanism to automatically dispense, from each sample of a set of the plural samples held by the solution holder, plural aliquots of a given sample to respective separate aliquot holders.

34. The apparatus according to claim 33, wherein the automatic dispensing mechanism comprises a process control to automatically dispense the plural aliquots of a given sample at respective different times during an amplification regimen.

35. An PCR amplification profiling apparatus comprising:

- 5                   a solution holder to separately hold plural samples of reaction mixture;
- a heat exchanging structure to cyclically control, for specified durations, a temperature of plural samples of reaction mixture among plural temperatures; and
- an aliquot dispensing mechanism to dispense, from each sample of a set of the plural samples held by the solution holder, plural aliquots of a given sample to respective
- 10   separate aliquot holders; and
- a separation device to analyze aliquots in the aliquot holders and separate, from respective ones of the aliquots, individual nucleic acid molecules based on physical properties of the nucleic acid molecules.

15                   36. The apparatus according to claim 35, wherein the dispensing mechanism comprises an automatic dispensing mechanism to automatically dispense, from each sample of a set of the plural samples held by the solution holder, plural aliquots of a given sample to respective separate aliquot holders.

20                   37. The apparatus according to claim 36, wherein the automatic dispensing mechanism comprises a process control to automatically dispense the plural aliquots of a given sample at respective different times during an amplification regimen.

                  38. The apparatus according to claim 36, wherein the separation device comprises a separation and quantitative analysis system.

                  39. The apparatus according to claim 38, wherein the separation device comprises an electrophoresis apparatus.

40. The apparatus according to claim 38, wherein the separation device comprises a capillary electrophoresis apparatus.